

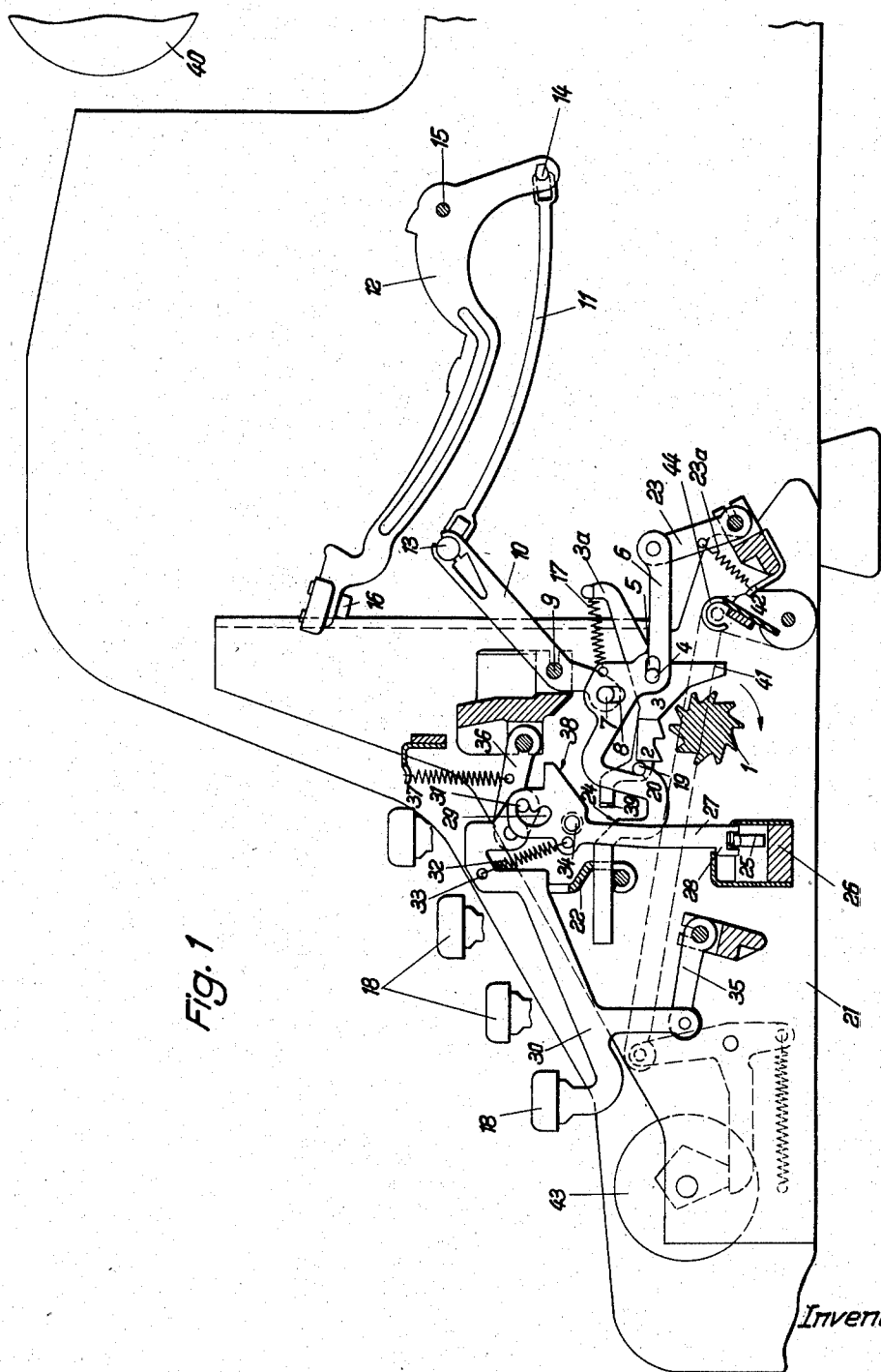
Jan. 27, 1959

H. RIFFEL
POWER-DRIVEN TYPEWRITER

2,870,896

Filed Nov. 25, 1953

6 Sheets-Sheet 1



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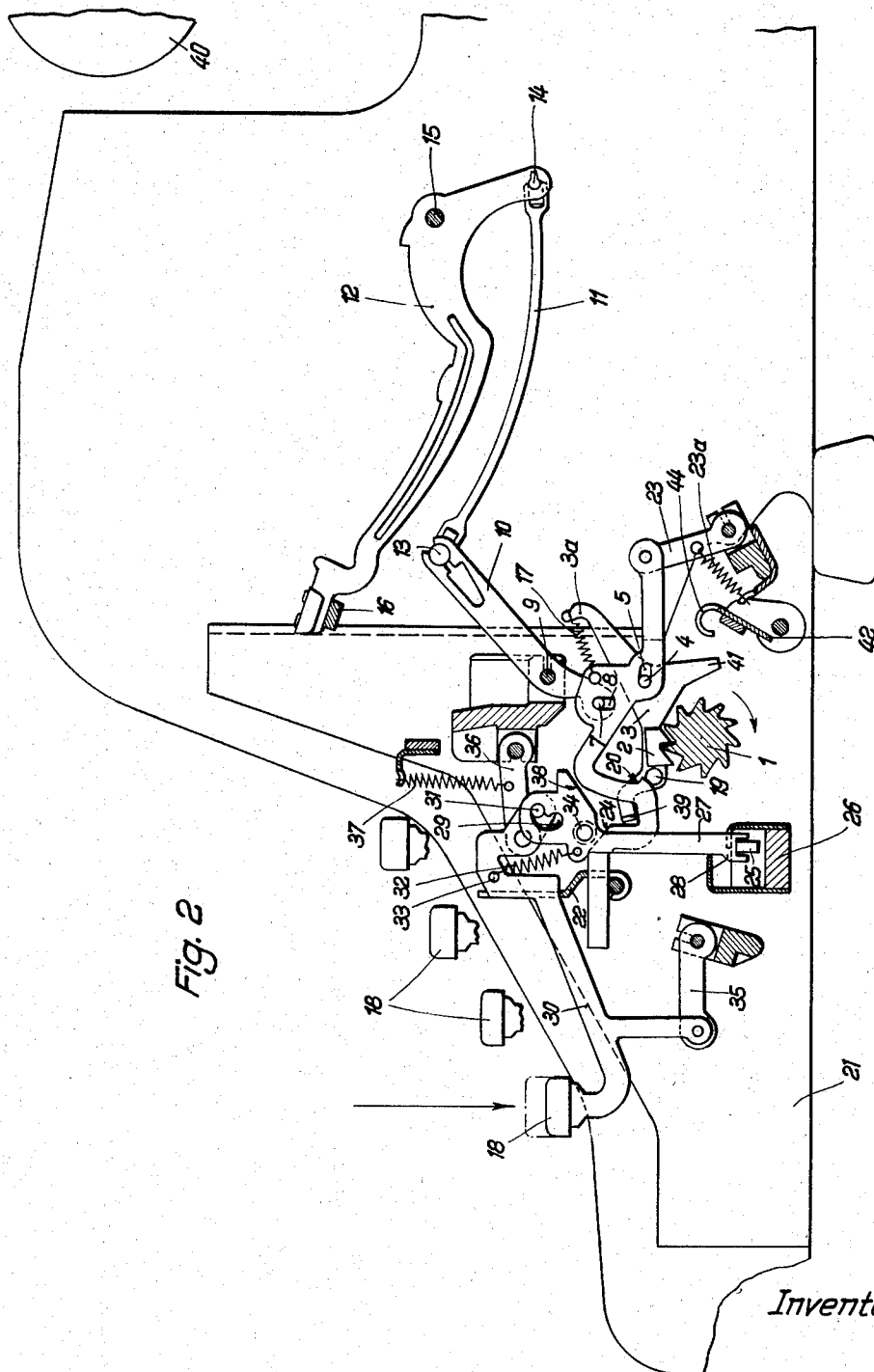
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6 Sheets-Sheet 2



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6 Sheets-Sheet 3

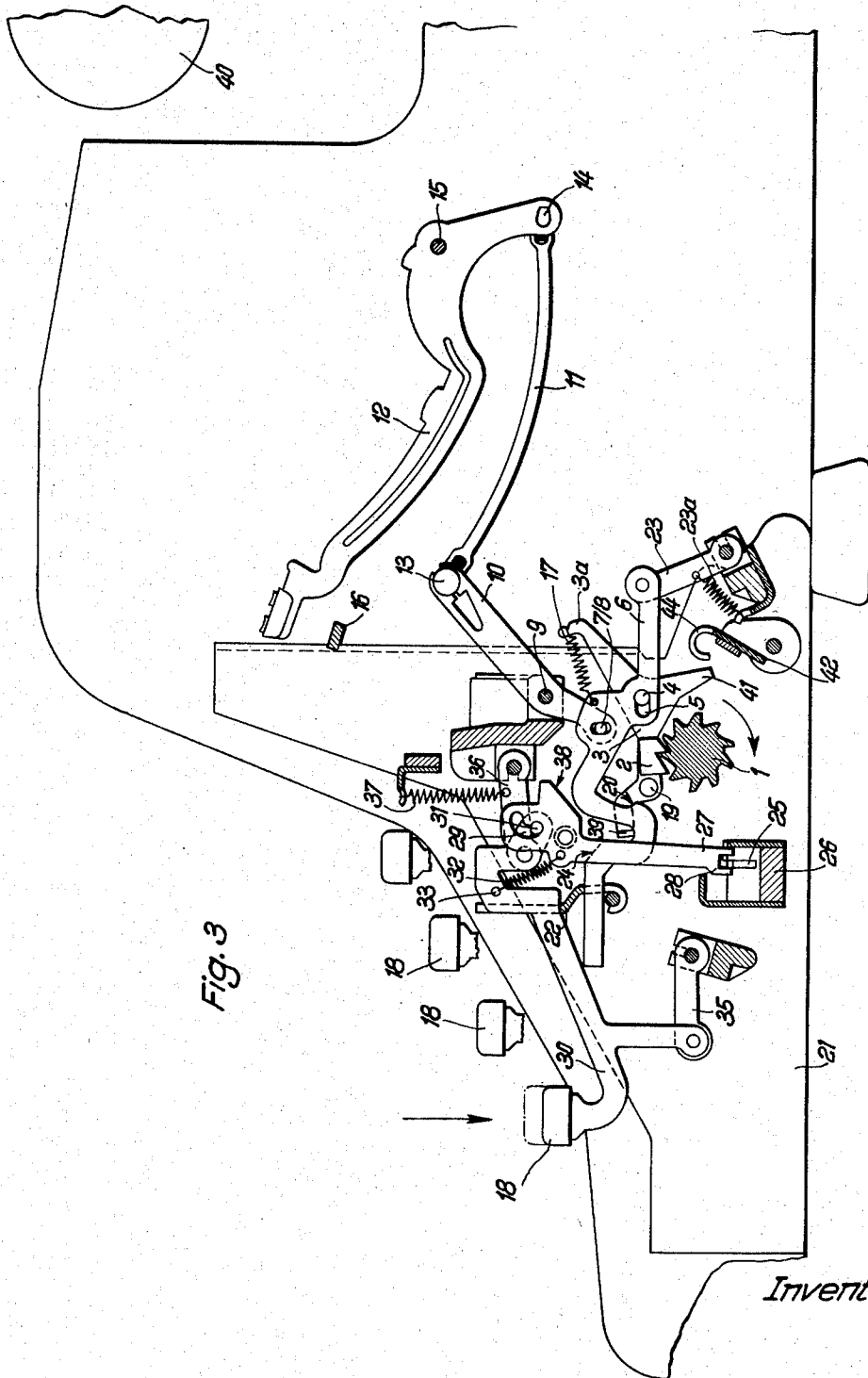


Fig. 3

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6 Sheets-Sheet 4

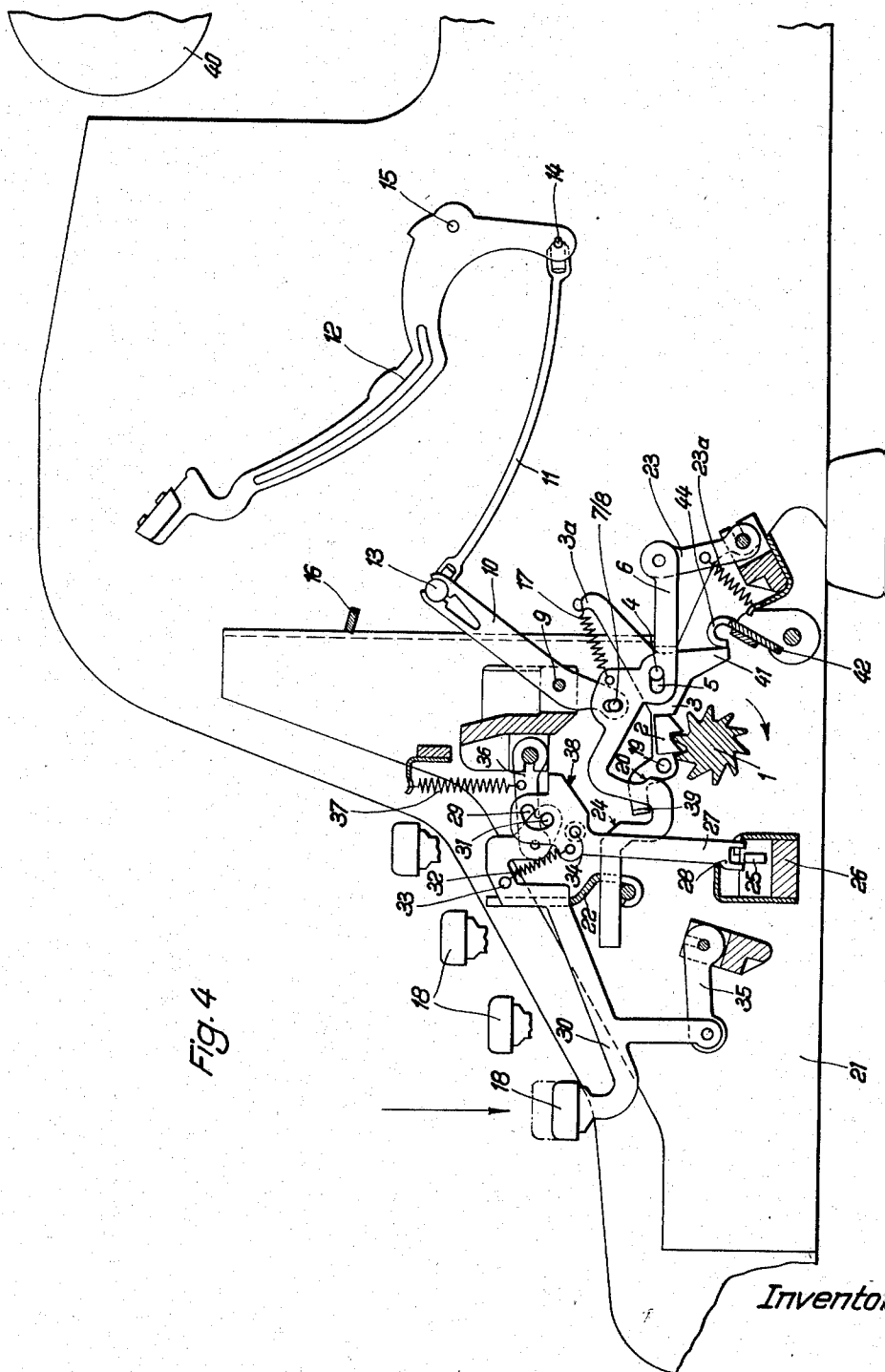


Fig. 4

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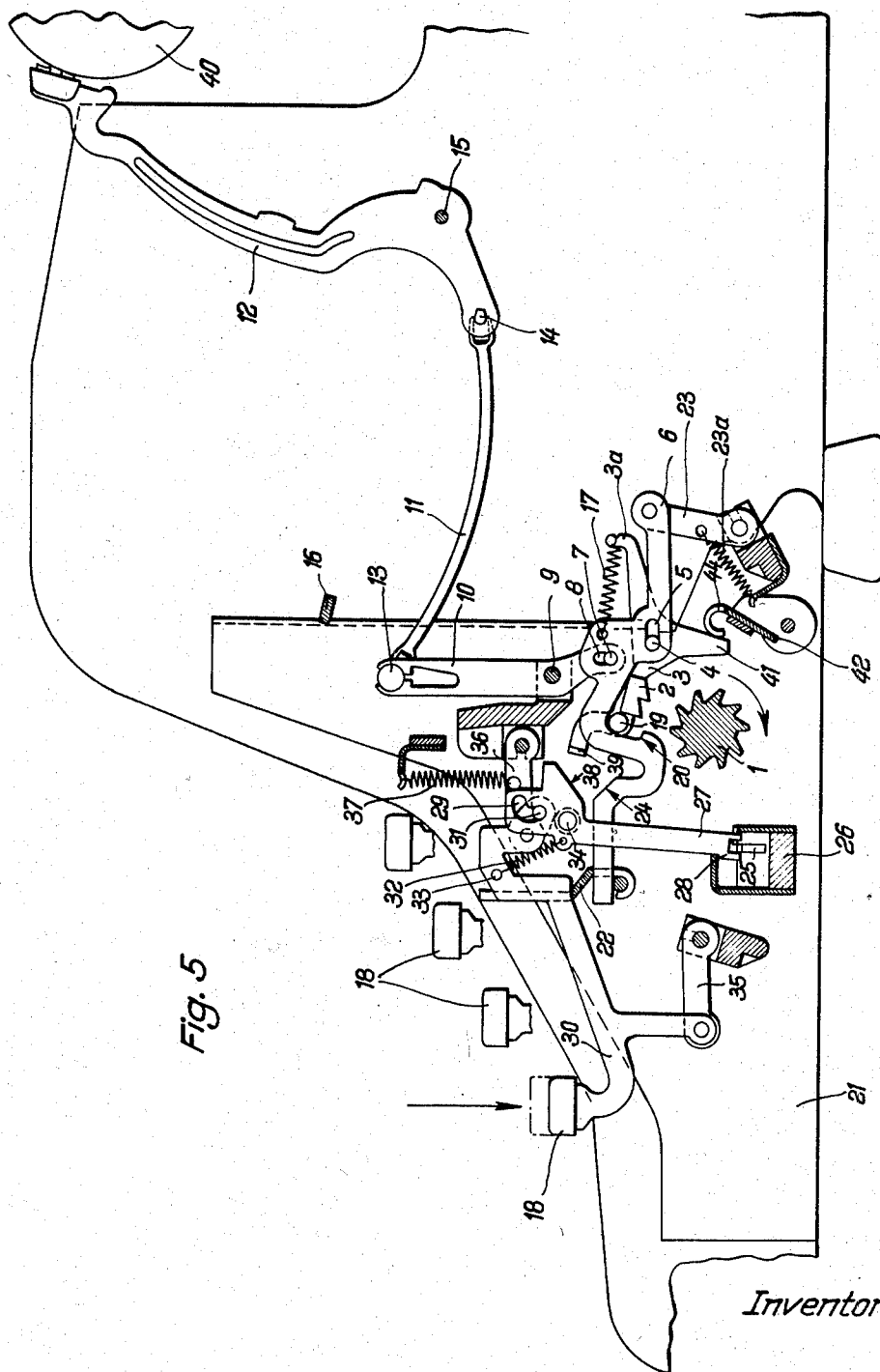
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6 Sheets-Sheet 5



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6 Sheets-Sheet 6

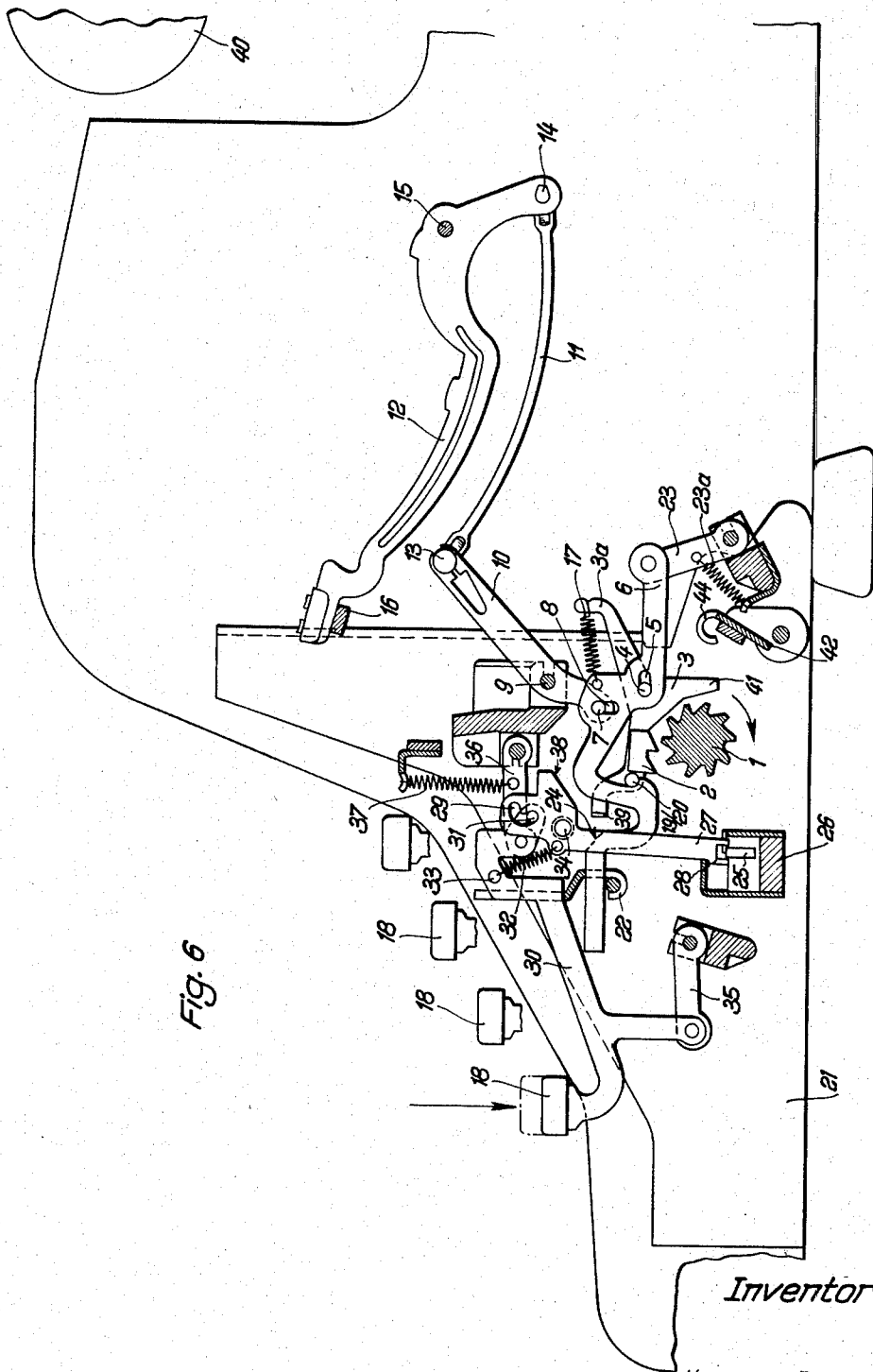


Fig. 6

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2,870,896

POWER-DRIVEN TYPEWRITER

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7 Claims. (Cl. 197—17)

The present invention relates to a power-driven typewriter of the type having a continuously revolving driving means, such as a toothed shaft, and a pivoted member, such as a toothed pawl, in operative connection with an associated type bar, which member can be swung into the path of movement of the teeth of said shaft; the simultaneous striking of several keys of the typewriter being prevented by means of a key lock which becomes operative when any one key is struck.

The known typewriters of this type have the disadvantage that a second key cannot be struck until the precedingly struck key has returned to its rest position, because it is only then that the locking levers or locking slides—which are, for example, attached to the key levers and co-operate with locking rollers or locking balls—have moved from their operative positions, in which they keep the keys locked, into the inoperative positions (with the keys released for striking). This set of technical conditions requires a special kind of touch in operating the typewriter and which, in view of the jerky, choppy technique which results, may be called, perhaps "staccato touch."

With manually operated typewriters, on the other hand, different conditions prevail. In this case, a mutual locking of the key levers is generally dispensed with, and as a result there is nothing to prevent several type bar motions being actuated with a short time lag, that is to say in rapid succession, so that at any one moment several type bars may be simultaneously in movement. The previously actuated type bar mechanism, and with it its associated key, may thus still be in an intermediate position, or may still be kept depressed, without thereby in any way interfering with the striking of the next key. Thus, in this case, the resulting touch is an even, flowing one which may be called, perhaps, "legato touch."

For power-driven typewriters there has further become known a key locking mechanism in which a locking slide, that is to say the part which co-operates with the locking members and is connected with the key lever, is controlled by the movement of the type bar mechanism in a manner such that, when the key is kept depressed, the locking action ceases as soon as the type bar has returned to its rest position. But even on typewriters fitted with this locking mechanism the touch cannot be as even as would be desirable, because the aforementioned control of the locking mechanism does not enable several type bar mechanisms to be in operation simultaneously with an appropriate time lag.

It is an object of the present invention to overcome the above-mentioned disadvantages of the known electrically operated typewriters with a view to providing a typewriter of the type referred to which, although it is fitted with a key locking mechanism, makes possible as even a touch as is associated with standard manually operated machines such touch being achieved without the risk of the moving type bars interfering in any way with one another, more especially without the risk of the piling of the type bars one upon the other.

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It is a further object of the invention to make it positively impossible for a type bar in a typewriter of the type referred to to strike repeatedly while a key is kept depressed.

According to the present invention a typewriter of the type referred to is provided with a key control mechanism associated with the type bar mechanism, wherein a locking slide which co-operates with locking members, such as rollers, balls or the like, is controlled by the type bar mechanism so that, while a key is kept depressed, the locking slide returns to its unoperated position (keys unlocked) shortly after the type bar associated with the key struck has started on its movement towards the platen of the typewriter. Thus, since according to the invention, the keys are unlocked shortly after the type bar has started moving and not only after the type bar has completed a to-and-fro movement, as in the case of known machines it is possible to keep without difficulty several type bars in motion simultaneously, always with a certain time lag governed by the control mechanism. In this manner a touch as flowing as that obtained with a manually operated typewriter can be achieved on the typewriter of the invention, without a risk of several moving bars colliding with one another.

Control mechanisms which satisfy the above conditions can, of course, be of widely different construction. A particularly simple, compact and mechanically advantageous construction of control mechanism is obtained by connecting the locking slide with the key levers by means of a curved guide, and preferably a pin-and-slot joint which is so arranged that, while, on the one hand the slide is capable of following the movements of the key lever it has, on the other hand, sufficient freedom of movement in respect of its associated key lever that, with the key kept depressed, an impulse initiated or supplied by the type bar when it starts on its path movement towards the platen can return the slide to its unoperated position in which the keys are unlocked.

The operative connection between locking slide and key lever advantageously comprises a guide or control slot, which may be of L-shape, arranged in the locking slide; one leg of said slot extending in the direction of the principal movement of the slide while the other leg extends at right angles thereto. In this construction the slide is acted upon by a spring capable of acting in the direction of the two legs of the L-slot.

The means for returning the locking slide from its operative position to its non-operative (that is to say non-locking) position may likewise be designed in a variety of ways since, in principle, the main purpose is to provide an articulated connection between the locking slide and a part of the type bar mechanism capable of satisfying the above-mentioned requirements.

For this purpose it is of advantage to provide as a means of returning the locking slide from its operative position to its non-operative position, a member operated by the type bar mechanism and which, when the key is depressed, engages a co-operating element provided on the slide, and in so doing causes the slide to move in a manner such that the leg of the control slot which is operative during the return travel of the slide is placed in its operative position. The aforesaid member for causing the said movement of the locking slide is located, according to the invention, on a component of the type bar mechanism which is supported on the machine frame for rectilinear movement with respect thereto. The said component, hereinafter referred to as the pawl carrier, supports a toothed pawl for actuating the type bar, the said pawl being supported on the carrier for rotational and sliding movement with respect thereto, the said carrier being provided with a notch in which the toothed pawl is locked after it has been swivelled out of the

path of movement of the toothed shaft by means of an arm controlled in known manner by a touch regulator. The last-mentioned feature enables the locking and driving mechanism to be made especially compact and neat. Furthermore, it provides that, even when a key is kept depressed, the corresponding type bar can only strike the platen once.

The invention will now be described with reference to the accompanying drawings in which one construction of an electric typewriter according to the invention, is represented in six phases of operation characteristic of the invention. In the drawings:

Fig. 1 is a longitudinal section through part of the typewriter, with all its parts in the rest position;

Fig. 2 shows the respective positions of the individual parts immediately after a key has been struck; the type bar is about to start on its movement, the key lock is still operative;

Fig. 3 shows the positions of the parts immediately after the type bar has started its movement; the key lock has just been released, although the key is still kept depressed; and the toothed pawl is in mesh with the drive shaft.

Fig. 4 is a further intermediate position of the type bar movement, at the beginning of the disengagement of the toothed pawl from the drive shaft;

Fig. 5 shows the positions of the parts on completion of the forward movement of the type bar; the toothed pawl is now about to drop into the notch on the pawl carrier, and

Fig. 6 shows all parts in their rest positions with the exception of the key lever which is still kept depressed.

The drive for the individual type bar mechanisms (of which in each drawing only one is shown) is obtained in known manner from a continuously rotating shaft 1 provided with longitudinal teeth around its periphery, the said shaft being driven also in known manner by an electric motor (not shown in the drawings). The member which co-operates with the shaft 1 and transmits the torque to the type bar mechanism comprises a double toothed element 2 rigidly attached to a pawl 3 to form a toothed pawl. The said pawl is supported by means of a pin-and-slot connection 4, 5 on a pawl carrier 6 slidable in the machine frame, the pawl being thus capable of rotational and sliding movement relative to the pawl carrier. The pawl carrier 6 transmits its movements through a pin-and-slot connection 7, 8 to a twin-arm lever 10, pivoted on the machine frame at 9, and from thence via a pivoted link 11 to a type bar 12. The link 11 is pivoted at 13 and 14 respectively to the lever 10 and the type bar 12 which is itself pivoted at 15 to the frame of the machine and engages a stop 16 when in its position of rest.

The toothed pawl 3 and the pawl carrier 6 are resiliently connected to each other by means of a tension spring 17 which acts on an upwardly directed arm 3a of the toothed pawl. So long as none of the keys is depressed, a stud 19 of the toothed pawl 3 engages in a notch 20 of the pawl carrier 6 (Fig. 1) and the pawl thus rests with its double tooth element 2 outside the path of movement of the teeth of the shaft 1. The pawl carrier 6 is slidably supported in the machine by a slotted rack 22 rigidly attached to the sidewalls 21 of the machine frame, in which rack one end of the carrier engages, the other end of the pawl carrier being connected through a link 23—which also carries a return spring 23a of the type bar mechanism—to the machine frame so that, as has been previously mentioned, the carrier performs a substantially rectilinear reciprocating movement during the movement of the type bar. The pawl carrier 6 is provided with an inclined surface or cam 24 which, as will be hereinafter described, controls the return movement of a key locking device shortly after the movement of the type bar has begun. The said key locking device comprises in usual manner a plurality of rollers 25 freely movable side by side in a longitudinal groove in a guide body 26,

leaving just enough space between one roller and another to enable one of a plurality of locking slides 27 to be interposed therebetween. Each of the said locking slides is guided at its lower end in the body 26 by means of a fork 28 and is provided at its upper end with a curved slot 29 in which a pin 31, positioned on a key lever 30, engages. The locking slide 27 has connected thereto one end of a tension spring 32 which acts obliquely to the longitudinal axis of the slide, the other end of the spring being attached at 33 to the key lever. A pin 34, supported on the locking slide 27 is adapted to be positioned in the path of travel of the inclined surface 24 of the pawl carrier 6 when the locking device is in the operative position.

Further structural details of the machine will be hereinafter described in connection with the explanation of the manner in which the machine operates; at this stage it should merely be mentioned that in the construction shown, the connection of the key levers is effected through parallel links 35 and 36 which enable the key levers to move in a substantially rectilinear path. A key lever return spring 37 is provided and the above-mentioned rack 22 provides lateral guiding means for the individual key levers.

The typewriter according to the present invention operates in the following manner:

When the toothed shaft 1 is revolving and one of the keys 18 is depressed, the locking slide 27 travels downwards together with its associated key lever 30 until it reaches its lowermost position, as shown in Figure 2. This causes the roller locking device to become operative, and no further key can now be depressed. During the downward movement of the locking slide an inclined surface or register 38 thereon engages a laterally extending projection 39, of the toothed pawl 3. By reason of the pin-and-slot connection 4, 5, provided between toothed pawl 3 and pawl carrier 6, the pawl moves to the right (as viewed in the figures) against the tension of the spring 17, until the stud 19 is disengaged from the notch in the pawl carrier. Immediately afterwards the toothed pawl is pulled back to the left by the spring 17 until the pin 4 engages one end of the elongated hole 5, and at the same time it is swung back into the path of the teeth of the shaft 1. These positions of the individual parts are shown in Figure 2. It will be seen that the key lock is still operative, that the toothed pawl has just engaged the shaft 1 and that the type bar is just about to start on its movement.

The teeth of the toothed shaft 1 now push the toothed pawl 3 against the tension of the spring 17 until the pin 4 engages the other end of the elongated hole 5. No movement of the pawl carrier 6, and thus of the other parts 10, 11, 12 of the type bar mechanism takes place until pin 4 has reached this position. Thus, it will be appreciated that the toothed pawl engages the shaft 1, resiliently, that is to say in a gentle manner, whereby the wear on the pawl teeth is greatly reduced and their long life is ensured. It will further be seen that the acceleration of the individual type bar mechanisms takes place in two stages, so that in the first phase of the drive only the relatively very small mass of the toothed pawl 3 requires to be accelerated, and the larger masses of the type bar mechanism require acceleration only in the second phase of the drive. This feature of the invention is likewise of very beneficial influence on the life of the moving parts of the machine.

A short time after the type bar 12 has started its movement in the direction of the platen 40, and the key is kept depressed, the inclined surface 24 of the pawl carrier comes into the path of movement of the release pin 34 on the locking slide 27. The upper portion of the latter is thereby swung to the right (as viewed in the drawings) so that the pin 31 of the key lever moves out of the horizontal leg of the curved slot 29 and is positioned on the axis of the downwardly extending leg

of the slot 29. When this position is reached, the spring 32 pulls the locking slide back to the non-operated position (Figure 3). In other words—the key locking device is made inoperative again shortly after the associated type bar has started its movement, and while the key is kept depressed, so that following thereupon another key can be depressed and in this manner a “legato touch” identical to that usual with standard manually operated typewriters can be achieved.

The operative connection between toothed pawl and the toothed shaft is maintained, as is usual, for only part of the type bar stroke. The disengaging process is initiated by a downwardly extending arm 41 of the toothed pawl which, after about half the movement of the type bar has been effected, engages a rack 42, known as a touch regulator, pivotally supported on the frame (Figure 4), and then swings the toothed pawl out of the path of movement of the teeth of the shaft 1 (Figure 5).

When the type bar is disengaged from its drive it effects the remainder of its movement towards the platen under its own momentum. By appropriate adjustment of the rack 42—for example by means of a turning knob 43 (Fig. 1) located on the keyboard and provided with notches—it is, therefore, possible to vary the moment of disengagement of the toothed pawl from the drive shaft within certain limits and thus to provide for a harder or softer touch of all type bars, as desired. By suitably displacing as by bending selected teeth 44 of the rack 42 it is, furthermore, possible to vary the force with which selected type bars strike the platen, that is to say to adjust the striking force for the individual type used.

When the toothed pawl 3 is disengaged from the shaft 1, the spring 17 returns the pawl with its stud 19 into the notch 20 of the pawl carrier 6, as soon as the pawl arm 41 is disengaged from the rack 42; when this has occurred, the toothed pawl is held in an inoperative position relative to the toothed shaft. In this manner it is made positively impossible for a type bar to be struck several times while its associated key is kept depressed, particularly so since the inclined surface 38 of the locking slide 27 has previously been moved out of the path of movement of the projection 39 of the locking pawl. Nor can piling of the type bars occur on the machine described above, because a further type bar mechanism cannot be actuated until the locking slide of the previously actuated mechanism has returned to its starting position (keys not locked), that is to say only after the type bar of the said previously actuated mechanism has covered some of its return travel in the direction of the platen. Thus, in other words, the individual type bars can be in movement towards the platen only with a certain time lag depending on the design of the type bar mechanism.

I claim:

1. A power driven typewriter comprising a frame, a drive member rotatably supported in said frame adapted to be continuously rotated, keys movably supported on said frame, type bars associated with said keys and movably supported on the frame for movement into engagement with a platen, a mechanism adapted to connect a type bar to the said drive member upon actuation of the corresponding key to effect movement of the type bar towards the platen, key locking members, a locking slide movable upon operation of the said key from an inoperative position to an operative position in engagement with the key locking members to prevent actuation of more than one key simultaneously, means urging the locking slide to the inoperative position, means releasably securing the locking slide in the operative position, and means operatively connecting the said mechanism to the locking slide effective to release the locking slide from the operative position shortly after the initiation of the said movement of the type bar towards the platen.

2. A power driven typewriter comprising a frame, a toothed drive shaft rotatably supported in said frame

adapted to be continuously rotated, key levers supported on said frame, type bars associated with said key levers and pivotally supported on the frame for movement into engagement with a platen, a pawl member operatively connected to each type bar and adapted to be moved from a position out of engagement with said toothed shaft to a position in engagement therewith to effect said movement of the type bar upon actuation of the associated key, key locking members, a locking slide spring-loaded to an inoperative position and movable to an operative position in engagement with the key locking members adapted to prevent actuation of at least two keys simultaneously, one said locking slide being provided for each key lever and connected thereto by a pin and slot connection adapted to effect said movement of the locking slide upon actuation of the key lever and to permit the locking slide to return to the inoperative position independently of the key lever, and means operatively connecting the locking slide to the type bar effective to release the locking slide for return movement to the inoperative position shortly after the initiation of said movement of the type bar towards the platen upon actuation of the corresponding key lever.

3. A typewriter as claimed in claim 2 wherein said pin and slot connection comprises a pin on the key lever engaging in an L shaped slot in the locking slide, one leg of the slot extending in the direction of movement of the locking slide from the inoperative to the operative position, and the other leg extending at right angles thereto to permit movement of the locking slide in said right angled direction.

4. A power driven typewriter comprising a frame, a toothed drive shaft rotatably supported in said frame adapted to be continuously rotated, key levers supported on said frame, type bars associated with said key levers and pivotally supported on the frame for movement towards a platen upon operation of a key lever, type bar actuating mechanism including a pawl member operatively connected to each type bar for movement into and out of engagement with said toothed drive shaft selectively to transmit the drive from the drive shaft to the type bar, key locking members, a locking slide spring-loaded to an inoperative position and movable to an operative position in engagement with the key locking members adapted to prevent actuation of at least two key levers simultaneously, one said locking slide being provided for each key lever and operatively connected thereto for movement therewith, means releasably securing the locking slide in the operative position, means for releasing the locking slide from the operative position, the said means being operatively connected to the type bar to release the locking slide shortly after initiation of the movement of the type bar towards the platen upon actuation of the corresponding key lever, and means on the locking slide effective to engage the said pawl member to move the pawl member into engagement with the toothed shaft to effect movement of the type bar upon movement of the locking slide from the inoperative position to the operative position upon actuation of the key lever.

5. A typewriter as claimed in claim 4 wherein said locking slide releasing means comprises a cam supported upon a slidable member operatively connected to the type bar actuating mechanism, the said cam being adapted to engage a pin on the locking slide to cause the locking slide to move to the inoperative position, the said engagement of the cam with the pin being effected shortly after the initiation of the movement of the type bar towards the platen.

6. A typewriter as claimed in claim 4 wherein the said pawl member is supported upon a pawl carrier supported in the frame for rectilinear movement towards and away from the platen, the connection of the pawl member to the carrier being a pin and slot connection permitting rotational and sliding movement of the pawl member

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relative to the pawl carrier, and wherein the said locking slide releasing means comprises a cam supported on the said pawl carrier and movable therewith into engagement with a pin on the locking slide to effect release thereof from the operative position.

7. A key locking device for power driven typewriters having typewriter keys, comprising key locking members, a locking slide adapted to be actuated by each of said keys into an operative position in engagement with said key locking members, the key locking members rendering all the keys inoperative except the one which has

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actuated its respective locking slide, and means operable in response to operation of the key by which the locking slide has been actuated to the operative position to effect release of the locking slide from said operative position.

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